



Evidence-Based Recommendations for Physiotherapy Management of Knee Osteoarthritis in India: A 3-Round Delphi Study

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ABSTRACT

Introduction: Osteoarthritis (OA) is a prevalent form of arthritis worldwide, causing significant functional impairment and reduced quality of life due to chronic pain. Despite the availability of research literature, there is no Indian physiotherapy guideline for patients with OA knee.

Methods: This study used a modified Delphi approach, involving a literature review and expert committee feedback. Eleven expert committee members, including physiotherapists and orthopaedic surgeons, participated in the study. The study consisted of three rounds of consensus, using the GRADE instrument to grade the quality of evidence and strength of recommendations.

Results: The consensus process identified evidence-based component getting affected (pain, strength, endurance, proprioception, kinesiophobia, posture, gait) in OA knee and treatment propositions (isometric exercises, strengthening, proprioceptive training, postural correction, agility training). The study demonstrated a rigorous approach to developing evidence-based treatment guidelines for OA knee, incorporating expert feedback and preferences. The final list of components getting affected and evidence-based physiotherapy protocol is under consensus.

Conclusion: This study developed evidence-based treatment guidelines for osteoarthritis knee management in India, emphasizing exercise therapy, patient education, and a multidisciplinary approach, while highlighting the need for tailored guidelines incorporating various exercises targeting different components, which are getting affected in OA knee.

Key Words: Osteoarthritis knee, Components getting affected, Physiotherapy protocol, GRADE guidelines, Multidisciplinary approach, Consensus-based study

INTRODUCTION

Osteoarthritis (OA) is a leading cause of arthritis worldwide, resulting in significant functional impairment and reduced quality of life due to chronic pain.¹ The prevalence of OA increases with age, affecting approximately 17% of people over 45 years and 40% of those over 65 years.^{1,2,3,4} Clinically, OA patients present with pain, swelling, tenderness, and reduced range of motion, among other symptoms.⁴ Recommended physiotherapy guidelines for OA of the hip or knee are as follow: APA (American Psychological Association 2005), APTA (American Physical Therapy Association 2009), Ottawa Panel 2005. Physical Therapy interventions in multidisciplinary guidelines for hip or knee osteoarthritis are recommended by following organizations: AAOS (American Academy of Orthopedic Surgeons), AGS (American Geriatrics Society), EULAR (European League Against

Rheumatism), MOH (Ministry of Health), NICE (National Institute for Health and Clinical Excellence), OARSI (Osteoarthritis Research Society International), RACGP (Royal Australian College of General Practitioners).⁵ Because of the physical, genetic, social, cultural and lifestyle differences OA affects Indian population differently. India's diverse population, varying healthcare systems, and unique cultural and lifestyle factors necessitate tailored guidelines. Some key considerations include: India faces distinct challenges in OA management, including limited healthcare access in rural areas⁶, diverse lifestyles, and cultural factors influencing treatment adherence.⁷ A study by Pal et al.⁸ highlighted the need for culturally sensitive OA management strategies in India, considering factors like traditional medicine practices and patient education levels. Additionally, India's rural-urban healthcare disparities⁹ and varying levels of physical activity due to lifestyle differences¹⁰ may impact OA

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management. Although the role and scope of physiotherapy interventions have been extensively studied in India, there is still a need for evidence-based guidelines tailored to the Indian population.⁶ This consensus study, utilizing a Delphi-based approach, aims to develop a list of recommendations for physiotherapy interventions in OA knee patients based on published scientific and empirical evidence.

METHODOLOGY

Ethical Approval and Informed Consent

Ethical approval was obtained from the Institutional Review Board of SPB Physiotherapy college. Ethical Approval Ref No: EC/SPB/112. Informed consent was obtained from all expert committee

Study Design: This study employed a modified Delphi consensus methodology, combining literature review and expert panel feedback.

Phase 1 - Literature Review Process

- Google Scholar, Cochrane, PubMed, EMBASE, PEDro and CINAHL databases were used covering the articles of last 10 years.
- Combined search terms 'physiotherapy', exercise therapy', OA knee only' were used. Studies of all designs were included including, systematic reviews, Meta-analysis and randomized controlled trials (RCTs). Only English language publications and full-length articles were included. As a result, obtained total 123 articles, 22 systemic reviews, 16 Meta analysis and 29 RCTs were filtered out.
- Based on inclusion and exclusion criteria 3 Systemic reviews, 2 Meta-analysis and 4 RCTs were selected for literature review.¹²⁻²⁰
- Based on evidences list of components and treatment propositions were listed for the expert review in Phase-2.

Literature Quality Assessment

Literature quality was assessed using the GRADE instrument.

GRADE Instrument¹¹

The GRADE instrument was used to grade the quality of evidence and strength of recommendations. The instrument assesses:

- Quality of evidence (High, Moderate, Low, very low)
- Strength of recommendations (Strong for or against, Weak for or against)
- Factors influencing recommendations (Quality of evidence, Desirable and undesirable effects, Variability in values and preferences, Use of resources)

The components getting affected in OA knee and exercises, which are most beneficial according to most of the evidences, were listed.

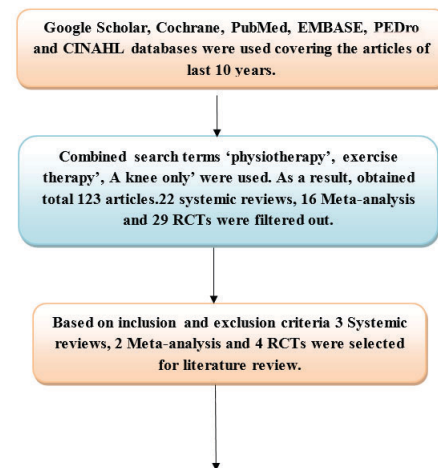
Expert Committee

The expert committee consisted of 11 members: eight qualified physiotherapists, 3 orthopedic surgeons practicing

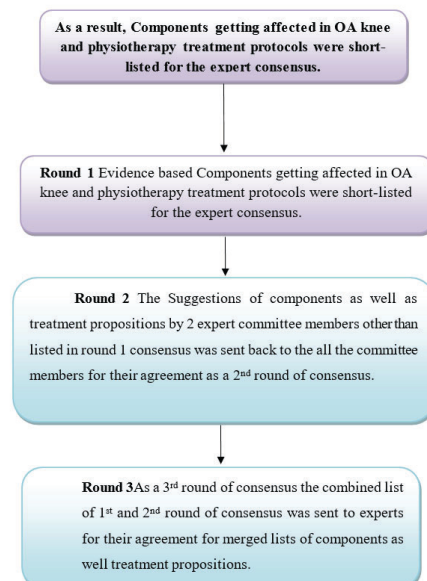
Selection criteria for expert committee:

- Specialty: Physiotherapy and Orthopedic Surgery
- Years of experience: >7 years (physiotherapists), >5 years (orthopedic surgeons)
- Geographic location: India

Phase-1



Phase-2



Phase-2 Consensus Process

The consensus process involved two phases:

Round 1: Evidence-based consensus for components getting affected as well treatment propositions in OA knee

Round 2: Consensus on suggestion obtained other than listed in round-1 consensus for components getting affected as well treatment propositions in OA knee

Round 3: Consensus on combined suggested (which obtain $\geq 80\%$ agreement) consensus for components getting affected as well treatment propositions in OA knee and previously proposed evidence-based treatment.

Consensus Threshold

A consensus threshold of 80% agreement was determined prior, based on previous studies. Components and treatments with $\geq 80\%$ agreement were included in the final list.

Round 1: Initial Feedback

As the 1st round of consensus of Phase-2, the list of evidence-based factors getting affected in OA knee and treatment propositions list was sent to expert committee members for their preferences recommending the factors and treatment propositions. Extra suggestions rather than mentioned list was taken in the same consensus. A list of factors and treatment propositions was sent to expert committee members for their preferences and suggestions. Experts provided feedback, and additional suggestions were incorporated.

Round 2: Narrowing Down Options

The suggestions of components as well as treatment propositions by 2 expert committee members other than listed in round 1 consensus was sent back to the all the committee members for their agreement as a 2nd round of consensus. The criteria were set of 80% agreement for including suggested component in the treatment protocol. If suggested component as well treatment propositions get at least 80% or more than 80% agreement then only it was added to the original list of components as well as list of evidence-based physiotherapy treatment protocol.

Round 3

In the combined list of factors getting affected and treatment propositions was sent to committee members for approval. In the third round, two members were disagreed. So, personal meet was arranged with those two members to know their expert viewpoint for their disagreement. In that conclusion was came out that members were considering the result as chronological order that is why they didn't agree in 3rd consensus. However, after personal meet, it was clarified that it was not chronological sequence, it was just a list of preferences of factors and treatment propositions evidence based as well suggestions based. Then both of them was agreed in the 3rd round of consensus.

RESULT

Round-1 Result:

Table 1: Preference of components getting affected in OA knee by experts

Sr No.	components	Preferences as expert's recommendations															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Pain	7	2	1	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
2	Swelling	NIL	5	3	NIL	NIL	NIL	1	NIL	NIL	NIL	1	NIL	NIL	NIL	NIL	NIL
3	Gait	1	NIL	2	NIL	1	2	1	NIL	NIL	1	1	1	NIL	NIL	NIL	NIL
4	Tenderness	2	1	1	3	1	NIL	NIL	NIL	1	1	NIL	NIL	NIL	NIL	NIL	NIL
5	Sleep quality	NIL	NIL	NIL	1	2	1	1	1	1	2	NIL	NIL	NIL	1	NIL	NIL
6	Ergonomic modification	1	1	NIL	NIL	1	2	2	NIL	NIL	NIL	NIL	NIL	3	NIL	NIL	NIL
7	Disability	1	NIL	2	NIL	NIL	1	3	1	1	1	NIL	NIL	NIL	NIL	NIL	NIL
8	Balance	NIL	NIL	1	NIL	NIL	NIL	NIL	2	4	1	NIL	1	1	NIL	NIL	NIL
9	Proprioception	1	1	NIL	1	NIL	1	1	3	1	NIL	NIL	1	NIL	NIL	NIL	NIL
10	Strength	3	1	3	NIL	NIL	NIL	NIL	NIL	NIL	NIL	1	1	NIL	1	NIL	NIL
11	Endurance	3	NIL	NIL	1	NIL	NIL	NIL	NIL	NIL	NIL	1	1	NIL	1	1	2
12	Functionality	NIL	1	1	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	2	NIL	1	1	4
13	Kinesiophobia	NIL	1	1	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	1	2	2	3
14	Central sensitization	NIL	2	NIL	1	NIL	NIL	NIL	1	NIL	NIL	NIL	NIL	NIL	1	2	3
15	Pelvic position	NIL	1	NIL	1	NIL	NIL	1	1	1	NIL	NIL	NIL	1	NIL	1	3
16	Flexibility	1	1	1	2	3	1	NIL	1	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

In the first round of consensus google form was designed based on evidences for the factors getting affected in OA knee. As it is mentioned earlier that experts were orthopedic surgeons having experience more than 5 years, Physiotherapists having experience more than 10 years. These expert panel criteria were set in intention to get the best opinion as all the panel members are dealing with patients with OA knee in their daily practice. Combined surgeon's prospective as well as physiotherapist's prospective was intended to design the wholesome protocol. As table 1 shows the preferences of the factors getting affected in OA knee according to the expert's opinion. There were 16 propositions and they were sent to 10 experts. According to table 1, 7 experts gave 1st preference to pain, 5 experts gave 2nd preference to swelling, 3 experts gave 3rd preference to strength, 3 experts gave 4th preference to tenderness, 3 experts gave 5th preference to flexibility, 2 experts gave 6th preference to gait, 3 experts gave 7th preference to disability, 3 experts gave 8th preference to proprioception, 4 experts gave 9th preference to balance, 2 experts gave 10th preference to sleep quality, 1 expert gave 11th preference to endurance, 2 experts gave 12th preference to functionality, 3 experts gave 13th preference to ergonomic modification, 2 experts gave 14th preference to kinesiophobia, 2 experts gave 15th preference to central sensitization, 3 experts gave 16th preference to pelvic positioning.

Table 2: Components getting affected in OA knee is as below.

Preferences	Components
1	Pain
2	Swelling
3	Strength
4	Tenderness
5	Flexibility
6	Gait
7	Disability
8	Balance
9	Proprioception
10	Sleep quality
11	Endurance
12	Functionality
13	Ergonomic modification
14	Kinesiophobia
15	Central sensitization
16	Pelvic position

Table 3: Preference of treatment propositions by experts

Sr. No.	Treatment Propositions	Preferences as expert's recommendations									
		1	2	3	4	5	6	7	8	9	10
1	Isometric exercises	7	2	NIL	NIL	1	NIL	NIL	NIL	NIL	NIL
2	Strengthening	3	5	NIL	2	NIL	NIL	NIL	NIL	NIL	NIL
3	Kinesthetic training	3	NIL	2	1	1	NIL	1	NIL	1	1
4	Proprioception	1	1	NIL	4	NIL	NIL	2	1	1	NIL
5	Endurance training	NIL	2	1	NIL	2	3	1	1	NIL	NIL
6	Gait correction	2	NIL	2	NIL	1	2	NIL	NIL	3	NIL
7	Stretching	1	2	2	1	NIL	1	2	1	NIL	NIL
8	Ergonomic advice	1	NIL	1	NIL	1	1	NIL	2	1	3
9	Agility training	NIL	2	NIL	NIL	2	NIL	NIL	1	1	4
10	Postural correction	NIL	3	1	1	NIL	1	1	2	1	NIL

Table 4: The final treatment propositions are as below.

Preferences according to experts	Treatment
1	Isometric exercises
2	Strengthening
3	Kinesthetic training
4	Proprioception
5	Endurance training
6	Gait correction

7	Stretching
8	Ergonomic advice
9	Postural correction
10	Agility training

Round-2 Result:

Table 5: Percentage of agreement by experts on suggested treatment protocol

Sr. No.	Preference of Treatment propositions	Agreement		Disagreement		Can't say	
		Frequency	Adequacy %	Frequency	Adequacy	Frequency	Adequacy%
1	MET	3	30	2	20	5	50
2	MWM	7	70	3	30	0	0
3	Pilates	5	50	2	20	3	30
4	Core Strengthening	8	80	1	10	1	10
5	Kinesio-Taping	4	40	4	40	2	20
6	Soft tissue mobilization	8	80	1	10	1	10
7	Yoga	2	20	5	50	3	30
8	PRT	2	20	3	30	5	50
9	Hold-Relax Technique	5	50	3	30	2	20
10	Aerobic exercise	8	80	1	10	1	10
11	PNF	7	70	2	20	1	10
12	Neuromuscular training	8	80	1	10	1	10
13	External support	4	40	4	40	2	20
14	Foot ware correction	7	70	2	20	1	10
15	Patient's education and lifestyle modification	9	90	1	10	0	0

- The table 5 shows the frequency and adequacy of agreement of experts on the suggested components. The components, which obtained 80% or more than that agreement was listed as below.

1. Core strengthening (agreement 80%)
2. Soft tissue mobilization (agreement 80%)
3. Aerobic exercise (agreement 80%)
4. Neuromuscular training (agreement 80%)
5. Patient's education and lifestyle modification (agreement 90%)

Round-3 Result:

- Final clubbed treatment protocol list is as below.

1. Isometric exercises
2. Strengthening
 - Muscle strengthening
 - Core strengthening
3. Kinesthetic training
4. Proprioception + MWM
5. Aerobic exercise for endurance training
 - Muscle endurance
 - Cardio-vascular endurance
6. Gait correction
7. Stretching + Soft tissue mobilization

8. Ergonomic advice
 - Patient's Education
 - Lifestyle Modification
9. Postural correction
10. Agility training

DISCUSSION

This study employed a multi-round consensus process to identify evidence-based factors affecting OA knee and treatment propositions. This study employed a modified Delphi consensus process to develop evidence-based treatment guidelines for OA knee, incorporating expert feedback and preferences. The consensus process involved multiple rounds, ensuring a rigorous approach to guideline development. Here is a breakdown of the process:

Round 1: Initial Feedback

- A list of factors and treatment propositions was sent to expert committee members for their preferences and suggestions.
- Experts provided feedback, and additional suggestions were incorporated.

1st Round of consensus evidence-based factors getting affected in OA knee and treatment propositions list was sent to expert committee members for their preferences recommending the factors and treatment propositions. Extra suggestions rather than mentioned list was taken in the same consensus

Round 2: Narrowing Down Options

- Suggested factors and treatment propositions from two expert committee members were sent to other members for agreement.
- Factors and treatment propositions with $\geq 80\%$ agreement was combined with Round 1 results.

Suggested factors and treatment propositions by 2 expert committee members were again send to other expert committee members for their agreement. Those factors and treatment propositions which got at least 80% or more than that agreement were combined with the 1st round result and combined list was send for approval as a 3rd round of consensus.

Round 3: Finalizing the List

- The combined list was sent to committee members for approval.
- Two members disagreed, citing concerns about the sequence.
- A personal meeting clarified that the list represented preferences, not chronological order.
- Both members agreed after clarification.

In the combined list of factors getting affected and treatment propositions was sent to committee members for approval. In the 3rd round 2 members were disagreed. So, personal meet was arranged with those 2 members to know their expert view point for their disagreement. In that it was came out the reason of their disagreement was they were taking it as chronological sequence that is why they didn't agree in 3rd consensus. But after personal meet it was clarified that it was not chronological sequence, it was just an evidence-based list of preferences of components getting affected in OA knee and treatment propositions, then both of them was agreed in the 3rd round of consensus.

Next Steps: Round 4

- The final round will focus on developing an actual treatment procedure based on preferences obtained in Round 3.
- The treatment procedure will be sent for final approval from experts.

Fourth round of consensus regarding the actual treatment procedure based on preference obtain in the 3rd round will be listed and will be sent for final approval of experts.

This consensus process demonstrates a rigorous approach to developing evidence-based treatment guidelines for OA knee, incorporating expert feedback and preferences.

Strengths and Limitations

The study's strengths include the use of a multidisciplinary expert panel, ensuring a comprehensive perspective on OA knee management. However, limitations include:

1. Panel size: The relatively small panel size ($n=11$) may not be representative of all experts in OA knee management.
2. Regional generalizability: The findings may be limited to the Indian context, given the specific healthcare setting and cultural factors.
3. Expert biases: The consensus process relied on expert opinions, which may not always reflect the best available evidence.

Comparison with Existing Guidelines²¹⁻²⁴

The discussion on consensus rounds for OA knee treatment aligns with various international guidelines, including those from the American Physical Therapy Association (APTA), European League against Rheumatism (EULAR), and Osteoarthritis Research Society International (OARSI). Here is a comparison of the study's findings with existing guidelines:

Similarities: Exercise Therapy: The study emphasizes exercise therapy, consistent with APTA, EULAR, and OARSI guidelines, which recommend exercise as a first-line treatment for OA knee management. Patient Education: Patient education is another key aspect of OA knee management, aligning with international guidelines. Multidisciplinary Approach: The study's use of a multidisciplinary expert panel reflects the complexity of OA knee management, consistent with guidelines from organizations like OARSI and RACGP.

Differences: Specific Treatment Propositions: The study highlights the need for tailored guidelines for the Indian population, emphasizing specific treatment propositions like isometric exercises and proprioception training. This contrasts with more general recommendations from international guidelines.

Clinical Implications and Implementation

The study's findings have significant clinical implications for OA knee management in India. The development of evidence-based treatment guidelines can reduce variability in treatment protocols, establish uniformity, and improve clinical outcomes. Implementing these guidelines in clinical settings can benefit a large population, given the high prevalence of OA knee in India. However, implementation challenges may arise due to:

- Limited resources: Clinics may lack necessary equipment or trained personnel.
- Cultural and socioeconomic factors: Patients' adherence to treatment may be influenced by cultural beliefs and socioeconomic status.

Future Research Directions

Future research should focus on validating the protocol in clinical settings, assessing its effectiveness, and exploring potential modifications for specific patient subgroups. Additionally, studies can investigate the impact of these guidelines on clinical outcomes, patient satisfaction, and health-care costs.

Balanced and Critical Discussion

While the study's findings are promising, it is essential to acknowledge the limitations and potential biases. The consensus process relied on expert opinions, which may not always reflect the best available evidence. Furthermore, the generalizability of the findings may be limited to the Indian context. Therefore, future studies should aim to validate the protocol in diverse settings and populations.

The study's emphasis on evidence-based practice and expert consensus highlights the need for ongoing research and guideline development in OA knee management. By incorporating the best available evidence and expert opinions, clinicians can provide high-quality care and improve patient outcomes. Ultimately, the study's findings contribute to the development of effective treatment guidelines for OA knee, which can benefit patients and clinicians worldwide.

The next steps in this research involve finalizing the treatment protocol based on expert feedback and preferences. The protocol will be sent for final approval from experts, and its implementation in clinical settings will be explored. By developing evidence-based treatment guidelines, this study aims to improve clinical outcomes and quality of life for patients with OA knee in India.

CONCLUSION

In conclusion, this study successfully developed evidence-based treatment guidelines for osteoarthritis (OA) knee management in India using a rigorous modified Delphi consensus process. The guidelines emphasize exercise therapy, patient education, and a multidisciplinary approach, aligning with international guidelines from organizations like the American Physical Therapy Association (APTA), European League against Rheumatism (EULAR), and Osteoarthritis Research Society International (OARSI). However, the study highlights the need for tailored guidelines for the Indian population, incorporating specific treatment propositions like isometric exercises and proprioception training.

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